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EDITORIAL

VOCATIONAL TRAINING FOR WOMEN.

Should women think? They gain in power, perhaps, but do they not lose in happiness? This question was settled long ago when we were given something to think with at the time of our creation. It is a law of life that we use what we have.

The world has never been partial to the thinking woman. When women first asked for an education the populace cried out that it would never do. There was a time when it was unlawful to teach a woman to read or write and most women were almost entirely uneducated until well into the nineteenth century. Men by their occupations are brought into contact with the world of ideas and affairs. They have been encouraged to be intelligent. Women have been encouraged to be foolish.

Back in the cave-dwelling days, there was a simple and definite distribution of labour: men fought and women worked. Men fought because they liked it and women worked because it had to be done. Tribes struggled for their existence and so the work of the warrior was held to be the most glorious of all; indeed, it was the only work that counted. The woman's part consisted of tilling the soil, gathering the food, tanning the skins, fashioning garments, brewing herbs and any other

light and airy trifle which might come to her notice. There are those yet who believe that house-keeping is the only occupation for women; men do as they like and indulge their individuality, but every truly womanly woman must take to the egg-beater and the vacuum cleaner. It is also believed that in the good old days before they began to be spoiled by the nefarious influence of higher education, all women adored housework and simply pined for Monday morning to come to get at the weekly wash and that they cleaned house with rapture. We all agree that the ideal work for a woman is to rear a family of children and we hear too much about the burden of motherhood and too little of its benefits. But, of course, it is not given to all women to be mothers, and although our grandmothers were horrified at the thought of vocational training for girls, we maintain that a woman has a right to do anything she has the ability to do.

The mass of women are too hesitant, timid and doubtful of themselves; they are content to stand back and not use the power and the brains and the conscience that they have. They have been too patient and unassertive. They have not set a high enough value upon themselves and it is pathetically true that the world values you at the value you place upon yourself. But now there is much discontent among women and many persons are seriously alarmed by it. They say that the wash-board has lost its charm. We may as well admit this discontent, but it is not necessarily wicked. It is the stirrings of ambition and the desire to grow. Many men find this disturbing, and disturbers are never popular. New ideas blow across some souls like a cold draught and they naturally get up and close the door. They have even been known to slam it.

People tell us now that chivalry is dead and women have killed it—bold women who have gone out to work and earn money, have gone to college side by side with men and have been so unwomanly sometimes as to even enter the professions. But the young and pretty woman can still get all the chivalry she wants while the poor old woman, grown grey and weather-beaten facing life's storms, what chivalry is shown her? Chivalry is like credit at the bank, those who need it most don't get it. Anyway chivalry is a poor substitute for justice, if one cannot have both. Women must bear their share of the burdens of the world, therefore they should be given every weapon whereby they can defend themselves.

The Arts Course which has been handed down from generation to generation is purely conventional. It is the result of a series of compromises in trying to fit the traditional education of clergymen and gentlemen to the needs of men of a different social era. General education meets the needs of nobody and therefore is adapted to all, men and women alike. The purpose of special professional education is to give each young man that training which will make a man of him. The best education for a young woman is surely not that which has proved less fit for the young man. She is an individual as well as he, and her work gains as much by relating it to her life. The intellectual needs of the two classes are not very different in many important respects. This is our defense of the entrance of women into the professional branches of education.

There are many good men who view with alarm the economic independence of women. They are afraid that with it women would never marry. But they would. Deeply rooted in almost every woman's heart is the love of home and children; but independence is sweet and there are women brave enough to refuse to marry for a home alone. The world has taunted women into marrying. So odious has the term "old maid" been in the past that many a woman has married rather than bear it. That this term has lost its odium is due to the fact that unmarried women have made a place for themselves in the world. The unmarried woman of to-day

has her vocation as a rule and is economically independent. The world is beginning to see that a woman may achieve success in other departments of life as well as marriage. When women are free to marry or not as they will, the financial burden of making the home will be equally shared by husband and wife; men will not be afraid of marriage because of its expense; marriage will become less of a straight "board and clothes" proposition; but free men and free women will marry for love, and together work for the sustenance of their families. It is not too ideal a thought. It is coming, and to the great benefit of marriage and the race.

Women are demanding their rights but are naturally loath to give up their privileges without a struggle. Men are said to arrive at conclusions by logic while women depend upon intuition. We beg to be allowed to attribute our many self-contradictions evident here to the exercise of the woman's prerogative of being illogical.

J.C.G.

OBITUARIES

DR. BENJAMIN ARTHUR BENSLEY

AN outstanding figure was lost to Canadian scientific and academic circles in the sudden death on Saturday, January 20, of Dr. Benjamin Arthur Bensley, Professor of Biology in the University of Toronto. A man of the most sterling character and high scientific attainment, Dr. Bensley had devoted much time and care to the development of instruction for students in the earlier years of the medical course, all such students in Toronto since early in the present century having come under his influence.

Born in Hamilton in the year 1875, B. A. Bensley in due time entered the University of Toronto, where he took what was then known as the Natural Science Course, graduating with honours in 1896. He was appointed Fellow in Biology and remained in Toronto until 1899, when he went to Columbia University as Fellow in Palaeontology, working under the famous Dr. Henry Fairfield Osborne. His energies at this time were devoted to a study of the evolution and systematic relationships of the marsupials and, after spending a year in London examining the British Museum collections which had a bearing upon his problem, he returned to Columbia and received the Ph.D. in 1903. The fruits of his research were fundamental scientific publications which won him the lasting admiration of those best able to judge them—other workers in the same and related fields.

In 1903 Dr. Bensley returned to the Department of Biology in Toronto, taking charge, among other duties, of the elementary medical classes in that subject. Upon the retirement of Professor R. Ramsay Wright, he became acting head of the Department, and in 1914 was promoted to full professorship and headship of the Department. He also became Director of the Royal Ontario Museum of Zoology, and to these two adminstrative positions he devoted himself with tireless energy and enthusiasm. Under his quiet and able guidance his Department expanded along many varied lines and, while it took up so much of his time that he could no longer give free rein to his abilities as an investigator, the two organizations which have developed under his hand remain as a memorial to his unsparing and broad-minded labours and the high ideals which he kept before him.

Another accomplishment was the organization of the Ontario Fisheries

Research Laboratory as a semi-independent unit within the Department of Biology.

Dr. Bensley's book "Practical Anatomy of the Rabbit" is a widely-used text, and at the time of his death he was engaged upon a text-book of comparative dental anatomy.

E. H. Craigie.

HENRY SEATON HUTCHISON.

BORN in Toronto, the son of Henry Hutchison of the firm of Rowsell & Hutchison, publishers, he was educated at Model School and Upper Canada College. Throughout his whole life he had a taste for music and literature, in both of which he had a certain ability, which professional duties restricted. He graduated in Medicine at the University of Toronto in 1900. He was appointed a Fellow of The Royal College of Physicians of Canada upon its foundation. For many years he did responsible work for the Canada Life Assurance Company, and later for the Crown Life and for some years he had been Chief Medical Officer in the latter institution. On account of this experience he was appointed Special Lecturer in Insurance in the University of Toronto, on the staff of which he was an Assistant Professor in Medicine.

During most of his professional life he had been on the staff of the Toronto General Hospital, both on the wards and in the Out-Patient Department, and in recent years was in charge of the Medical O.P.D., where he made his most intimate contact with students.

He was a member of the Zeta Psi Fraternity and of the Toronto Golf Club.

THE WOMEN'S COLLEGE HOSPITAL

HARRIET MEIKLEJOHN, R.N.
Superintendent, Women's College Hospital.

The above is the cut of the proposed New Women's College Hospital, so long anticipated by those interested, and which is about to be erected in the very near future. This Hospital will be constructed on the square now owned by the Hospital, bounded by Grenville Street, Surrey Place and Grosvenor Street, with a lane on the east side.

The Women's College Hospital is a general hospital for women staffed by women physicians and surgeons and the only one of its kind in the Dominion of Canada. It will comprise the Services of Surgery, Gynaecology and Urology, Medicine, Obstetrics, Oto-Laryngology, and Out-Patient Department. The new building has been long needed. The Out-Patient Department had some 20,000 visits in the past year. The in-patients in the present 60-bed hospital numbered over 2,000 with a steady waiting list of over 100 patients, and we have usually in the neighborhood of 600 births a year.

This hospital is a long and interesting history of the growth and development of Woman's endeavour for Woman, and it shows an even, steady growth over its thirty years of existence. In our new quarters we will be able to accomplish a greatly augmented piece of work and care for the patients who would like to come to us and whom we have been unable to accommodate.

In the central east to west portion of the above picture which is now to be constructed, will be a complete hospital unit. In years to come as need

arises and accommodation requirements demand, the wings of the hospital can be added. There will be accommodation for private, semi-private, public and city order patients in all of the above services. The public wards will accommodate from four to six beds, and provision has been made for many small single rooms to rent at moderate prices as well as for a few more elaborate rooms for those who wish for better

accommodation. About 150 beds and 60 infant cots will be provided in this first unit and in the final analysis the hospital should comprise some 300 adult beds.

As well as the above, the new building will house operating rooms, maternity case rooms, with all necessary accessories sufficient to meet the needs of the number of beds provided. The laboratory will be provided with space for pathology, bacteriology, blood chemistry and museum. There will be a modern X-ray department with provision for cystoscopy and fracture work, an admitting department and detention ward. The building will also accommodate kitchens and dining rooms with all service requirements, an office and waiting rooms and all the many accessories of a general hospital.

We believe that our hospital will be easy of management, and control, and economical in that we are building up in the air rather than over a large ground area. Patients' accommodation will begin on the third floor and as the wings are added, we should have very excellent roof exposure, facing full south with a beautiful view over the down-town section of Toronto and out over the lake.

We are greatly looking forward to the day when we will be able to turn our first sod.

AN EXPERIMENT.

This issue of the Journal has been written by women from cover to cover, except for the obituary notices. It is not a foolish attempt to segregate the sexes even in their writings, but just an experiment undertaken in the hope of eliciting a little friendly competition and of encouraging non-participating women undergraduates to exercise their literary talents more freely in these pages.

ANTERIOR-PITUITARY-LIKE EXTRACT
AND ITS USE IN THE PREVENTION OF ABORTIONS

A MARION HILLIARD, M.D.

During the last ten years the greatest interest in Gynaecology has been in the field of hormone activity. Startling changes have occurred in our thinking regarding the inter-relationship between the internal secretions of the ovaries and the pituitary. From the work of Frölick in 1901 the fact that there was a relationship between the ovaries and the pituitary gland was established. From that time various workers have tried to get more definite results.

Due to the complexity of the hormones found and the variability of their activity, it is always difficult to follow the nomenclature of the various investigators. However, certain definite conclusions have been laid down and I would refer you to the classical experiments of Aschheim and Zondek. "The hormone of the anterior lobe is the motor of the sexual function. This hormone is primary, the ovarian hormone is secondary. The anterior lobe hormone brings the follicular apparatus into action, discharges the follicle ripening, and mobilizes secondarily the ovarian hormone into the follicle cells."

As soon as these hormones could be distinguished it was found that the anterior lobe hormone was present in high concentration in the urine of the pregnant woman. This could be detected as early as eight days after the missing of a period and remained present throughout the pregnancy. In other words there is this characteristic increase as long as the foetal tissue is in biological contact with the maternal blood.

Further investigation showed an increase in the amount of anterior pituitary hormone in the presence of hydatidiform mole and chorioma. The next question was whether the chorionic villi and placental tissue were active agents in producing anterior pituitary hormone or only acted as a storehouse. Aschheim and Zondek differentiated several homones in the anterior pituitary extract. The two main ones they called Prolan A and Prolan B. Weisner working at the same time on the same problem named the hormones Rho I and Rho II. Although the principles of this hormone activity were worked out to some degree, considerations as to how it could be obtained for practical purposes were still very obscure. Collip, at McGill University, stimulated by the advice of Weisner began working on an extract of placental tissue. He found a complex hormone which could be separated into several hormones, two of which resembled in activity Prolan A and Prolan B. He called this an anterior-pituitary-like extract, commonly known as A.P.L.

As you read the various experiments and results in this field you wonder whether we are ever going to be able to use these extracts to the advantage of women in clinical practice. There is one practical result at least which is used by every Gynaecological Clinic and that is the Aschheim-Zondek test for pregnancy.

There is another practical therapeutic measure arising from this work which I wish to suggest, i.e., the possible prevention of abortion in cases where there is no obvious cause, especially in cases of habitual abortion.

In these cases you are assuming that abortion results from failure of the foetus to embed itself firmly in the endometrium of the uterus. The chorionic villi apparently have not sufficient vitality and we suppose that this lack is due to an insufficient stimulus from the anterior pituitary via the

ovary. To increase this stimulus we give A.P.L.

In these four cases I am reporting there is one which might be included in the class of habitual abortions. In two cases A.P.L. was used as a therapeutic measure with a threatening abortion following a previous complete abortion. In the fourth case the result was definitely contrary to expectation.

Case I.

Woman of 23 years. First came to seek advice May 15th, 1932. L.M.P. March 27th.

Past Obstetrical history—miscarriage Sept., 1931, after daily spotting of blood of varying degrees for six weeks.

Past history and family history—negative.

General examination showed patient to be in good condition.

Pelvic examination—Uterus apparently pregnant, anteverted, freely movable, adnexa clear, cervix down and back.

Patient given special instructions to avoid heavy lifting, straining, washing, etc., because of previous miscarriage.

Patient reported again in two weeks time, everything normal.

On June the 11th spotting of blood from the vagina began—patient put to bed with usual treatment for threatening abortion.

Incomplete abortion June 18th—taken into hospital. Dilatation and curettage done.

July 12th—normal period—on Aug. 12th and succeeding days—symptoms of coming period but no bleeding.

On Sept. 1st, severe pain followed by profuse bleeding and passage of several clots. Was not seen at the time and no definite diagnosis of abortion could be made.

After this episode patient was warned to return immediately if period was late or there was a sign of spotting.

Periods on October 1st, November 1st and December 3rd were normal.

Beginning January 3rd there was slight spotting. Immediately the patient was put to bed and given an injection of 1c.c. of A.P.L. (intramuscular). This was repeated on alternate days for the first week. Then three times a week for two weeks, and later twice a week until the third reguar menstrual period was passed. It was interesting to note that there was some bleeding at intervals during the two months and it increased in quantity until the next dose of A.P.L. was given. The remaining months of pregnancy were uneventful and the patient was delivered on August the 23rd of a normal female child weighing six pounds.

Case II.

Patient first seen April 18th, 1932—married July, 1931—age 25 years—periods normal until March 24th when period was short, lasting only two days. On April 4th only there was some spotting of blood—patient apparently pregnant.

Patient seen again on May 2nd—no further spotting—uterus in good position—apparently about two months pregnant.

Patient had complete abortion on May 8th. One month following a complete examination was made—all findings were negative. Basal metabolism rate 102.

Patient next seen Sept. 28th, 1932—last regular period August 16th—patient given A.P.L. 1c.c. by intramuscular injection twice a week until third regular period was passed—no sign of bleeding—uneventful pregnancy—delivered of a normal child.

Case III.

Patient first seen March 30th, 1931—age 25 years—excellent physical condition—married April, 1930—periods regular until February 15th. Apparently pregnant at this time.

On April the 8th some spotting occurred—patient put to bed with usual precautions—this continued slightly until April 17th when abortion occurred.

In June the patient was thoroughly examined—all findings were negative. Basal metabolism rate 98.

Patient next seen Nov. 10th, 1931—L.M.P. Aug. 30th—patient apparently pregnant—put on special regime—extra rest, etc., also given thyroid gland (P.D. & Co) gr½ twice daily.

Dec. 2nd, spotting of blood occurred—patient was put to bed—in bed for three weeks—rest of pregnancy was uneventful—delivered of a normal child in June, 1932.

Next seen Sept. 11th, 1933—L.M.P. Aug. 8th—given 1c.c. A.P.L. by intramuscular injection and repeated twice a week—patient in excellent condition—no sign of any discharge whatever—able to carry on in the ordinary way.

Summary: These histories would indicate that there was a definite clinical value in the use of A.P.L.

Case IV.

Patient first seen Oct. 9th, 1931—age 28.

Past obstetrical history—one child age 6—uneventful pregnancy, labour and recovery.

Ectopic in right tube 1927—very severe internal hemorrhage—recovery from operation uneventful.

The only factor in past history was severe hay fever of autumn type, with very little help from vaccine treatment.

L.M.P. July 25th—pregnancy perfectly normal—delivered of a normal child April 27th, 1932.

Post natal examination June 8th showed pelvic organs in good condition, no abnormality noted.

Patient next seen July 27th, 1933—the menstrual periods had been growing scanty—periods still coming every 28 days, lasting only 1 to 2 days. Complete examination showed no abnormality in pelvis. The dates of periods could not be obtained accurately, so the patient was advised to watch more closely and return in two months.

On September 7th the patient phoned to say that since the August period there had been a continuous brownish discharge, seen every day, but not profuse. The patient feared another ectopic pregnancy. On examination it was apparent that there was a uterine pregnancy. To make sure an Aschheim-Zondek test was done on Sept. 8th, which was reported positive. The patient had been in bed since Sept. 5th and the discharge was clearing up, but as soon as pregnancy was certain, i.e., on Sept. 11th at 12 o'clock noon, an intramuscular injection of A.P.L. was given. At 6 p.m. the patient phoned to say she was very nauseated, that there was considerable increase in the bleeding from the vagina and that there was also oozing of blood from the mucous membrane of the mouth. These signs subsided and the flow gradually ceased.

On October 4th the patient miscarried.

The result in Case IV was most unexpected, and in attempting to explain it three factors must be borne in mind:

1. The patient suffered from hay fever and the result may have been an allergic effect. This is unlikely, as sensitivity phenomena are not commonly seen following such injections.

2. The scanty periods preceding the pregnancy suggest some pre-existing glandular imbalance of more long-standing character than that usually occurring in patients habitually aborting. A.P.L. in this case may thus have acted as a precipitating factor instead of fulfilling a deficiency.

3. The extract itself is such a complex composite of hormones that it is impossible to state definitely the active factor or account specifically for results in any particular case.

The use of A.P.L. extract is still in its experimental stage, and little is, as yet, definitely known regarding the results to be obtained. It is foolish to proclaim it as a panacea for all glandular disorders related to menstruation and pregnancy, but it is interesting to speculate in view of the good results being obtained in various fields, on the future possibilities of this drug.

ACUTE EXTERNAL OTITIS

JANE SPROULE MANSON, M.D.

In choosing External Otitis as the subject for this brief review I do so, not in the hope of adding anything to the facts which may be gleaned from text-books, but to present some aspects of this less serious but often extremely distressing affection, which may assist the student in his early studies of inflammatory ear conditions.

Anatomy.

Excluding conditions of the auricle —the exposed portion of the external ear—the subject narrows itself down to inflammation of the external auditory meatus. Recalling a few of the salient points in the anatomy of this canal, significant in inflammatory affections therein, we note—

1. The length and circuitous nature of the canal—it measures about 24 mm, but is subject to considerable variation in depth as well as in direction and calibre. Its general direction is inward, forward and downward. It starts inward in a forward and upward direction, is then directed backward and at its inner half, forward again and downward. It is widest at the two extremities, narrows where the cartilage is attached to the bone and again at the inner third of isthmus of the canal.

2. The unyielding nature of its walls—bony in rather more than its inner half, cartilaginous and but slightly movable in its outer.

3. The nature and close attachment of the lining of the canal—consideration of this is important. The passage is really a cul-de-sac, the only one in the body lined with skin—a distinction which carries with it some extremely troublesome possibilities, for while in the bony meatus the epidermis is devoid of glandular structures, in the cartilaginous portion it contains the hair follicles, sebaceous and sweat glands common to skin elsewhere. In the outer portion a thin layer of fibrous tissue is interposed and is intimately attached to the perichondrium which is richly supplied with vessels and nerves, a significant feature in consideration of the pain associated with inflammation in this region. In the bony portion the skin is very thin, is directly and firmly attached to the periosteum and passes over the drum membrane forming its third and outer layer.

4. The lymphatic service — three groups, — terminating in the anterior auricular gland in front of the tragus, the post auricular or mastoid glands, the inferior auricular and upper post cervical.

5. The relationship to surrounding structures—

(a) The bony roof lies in relation to the mid fossa, its proximity depending upon the thickness of the individual bone.

(b) The floor throughout is in relation to the parotid gland.

(c) The posterior wall is separated from the pear-shaped mastoid process by the tympano mastoid fissures and in its inner portion bears an inconstant relation to the mastoid antrum, the mastoid cells and the sigmoid sinus.

(d) The anterior wall both bony and cartilaginous lies in relation to the tempero-maxillary joint and the cartilaginous portion is drawn upon in movements of this joint (inserting one's little finger into the external auditory meatus and moving the joint as in chewing or yawning will demonstrate the practical significance of this relationship in acute meatal affections). The cartilaginous meatus is in relation also to the superficial tem-

poral vessels, the auriculo temporal nerve, the upper part of parotid and the preauricular lymphatic gland.

One other relationship I would draw to your attention—that of the drum membrane to the canal walls—a relationship of practical importance in examination and manipulative treatment. The upper and posterior canal walls are shorter, therefore the drum here meets the eye sooner, more readily—it is nearer to you. The anterior and inferior walls extend farther inward toward the median line of the skull before they meet the anterior and inferior borders of the drum head, that is, the upper wall is shorter than the inferior wall, the posterior is shorter than the anterior. Therefore the plane of the drum must be an inclined one—downward and forward as well as outward—what I like to think of as the ear to the ground or the listening position. Thus we have the anterior and inferior walls meeting the drum at an acute angle and more distant from the eye. This makes for difficulty in examination and difficulty in direct treatment, especially since the convexity on the bony floor of the meatus, close to the drum, provides a sulcus between it and the drum where discharge and foreign matter may lodge. These points, taken together with the sinuous direction of the canal explain the difficulties arising in aural examinatons, but the fact that the cartilaginous portion of the canal is movable at its attachment to the bony portion, that it is incomplete in its upper posterior part (the gap filled in with fibrous tissue) and has two deep clefts (Fissures of Santorini) in front and below, makes it possible to straighten the curves by drawing the auricle up and back, so that even in a particularly rigid and narrow canal it is possible to get a quite satisfactory and complete view of the tympanic membrane.

* * * * *

Given now this deep cul-de-sac—confined in its boundaries, inelastic in its tissues, richly supplied with nerves—and recalling the cardinal signs of inflammation—pain, redness, swelling and disturbance of function, you will readily realize that pain will be the outstanding complaint of the patient with acute inflammation of the external auditory canal. But pain is also a dominant feature in acute inflammation and before proceeding further I want to emphasize the supreme importance of determining definitely whether the inflammation is in the meatus or in the middle ear or both, for while external otitis is intensely painful, Otitis Media is both painful and dangerous.

Therefore our first principle in dealing with inflammation in this region is to assure ourselves as to whether or not it is confined to the meatus. This is fairly easily determined if the physician is consulted early. In the external variety, even in the early stages the speculum elicits tenderness of the canal, traction on the auricle and movement of the joint produces discomfort; the hearing is not disturbed and finally a clear view of the tympanic membrane discloses no signs of acute inflammatory reaction. In the later stages when extreme tenderness is present and the swelling is so marked as practically to occlude the lumen, a view of the drum head is not so easily obtained and much patient effort on the part of the physician and fortitude on the part of the patient is demanded before success is attained. Even then its appearance may be masked and you are still in doubt. The patient's response to your efforts in clearing the drum surface is enlightening. In an acutely inflamed drum the contact of a cotton tipped applicator against the drum, as in wiping, is insupportable, while a drum whose surface is only thickened and sodden or practically normal does not give this acute response. In some cases it is unwise or inadvisable to pursue one's efforts to view the drum and one's decision must be reached through

other findings. The degree of deafness, the variation from normal of the pulse and temperature are usually more marked in Otitis Media while often even in the early stages of the latter there is some degree of tenderness to pressure over the mastoid.

Having determined that the inflammation is confined to the meatus we will no doubt have decided also to which classification it belongs. Let us consider first two well recognized types—

A. Acute Circumscribed External Otitis.
B. Acute Diffuse External Otitis.

A. Acute Circumscribed External Otitis.

The circumscribed variety, commonly spoken of as a furuncle or boil is produced by an infection (usually staphlococcal) of a pilo-sebaceous gland. It begins as a tender area confined, as you will have readily adduced from its point of origin, to the cartilaginous meatus.

No change in the surface appearance may at first present itself to the eye of the examiner and the tender point or points (there may be more than one) be disclosed only by careful palpation with a cotton tipped applicator.

As the affection progresses however, all the characteristic symptoms of meatal inflammation gradually supervene—the lumen is early encroached upon by a tense localized swelling acutely sensitive to pressure and a speculum if inserted must be well chosen as to size and passed with the greatest nicety. Pain is most severe in this stage, frequently radiating to head, throat and teeth. Traction on the auricle and mastication increase the pain. Tenderness appears in the glandular areas, primarily in front of the tragus and the condition passes over into the stage of suppuration with perhaps some slight relief from the intense pain and tension, with fluctuation and increased bulging into the meatus or with the more happy result of pointing and the spontaneous discharge of pus into the canal.

Treatment.

This depends on the stage of development. If fluctuation is already present the condition is a surgical one and the abscess must be freely incised, the pus evacuated and drainage and proper cleansing of the canal maintained until healing is secured. The operation, though short, is best performed under a general anaesthetic.

If the lesion is in its initial stage or if the picture is that of a tense, hard, extremely tender swelling with no fluctuation present, it is best to wait until it "comes to a head." The swelling must be supported and kept from contact with healthy tissue by the insertion into the canal of a strip of antiseptic gauze or cone of suitable size well smeared with lubricant (the antivirus staphlococcus jellies have lately been much recommended). Heat to the part is desirable, preferably dry. General treatment must be directed toward the alleviation of pain and the procuring of rest by means of sedatives, and the administration of bland, light nourishment requiring a minimum of mastication. Under this regimen the furuncle may subside or it may continue to develope and require incision.

If not seen until very late the picture may be complicated by the presence of a swelling behind the ear with the auricle pushed forward and outward, and on first thought a diagnosis of Mastoid involvement may be made but a study of the meatal picture, the history of the onset, the continuous nature of the pain, the influence of mastication and auricular traction, the drum picture and lack of true bony tenderness over the mastoid will assist in ruling out this process and satisfy you as to the cause of the swelling—a furuncle—the pus having penetrated through the posterior meatal wall.

A disconcerting feature of furuncu-

losis is its tendency to recurrence often in crops, therefore the physician must be on the lookout for underlying and contributing causes both local and general—a chronic discharging Otitis Media, an eczema, a habit of scratching the ear; general systematic affections as anaemia, nephritis or diabetes. Foci of infection as in teeth or tonsils may well be eliminated and possibly a course of vaccines given.

B. Acute Diffuse External Otitis is, as its name implies, a generalized inflammation of the canal wall, with a generalized redness and swelling, a generalized infiltration of the tissues, with a consequent generalized narrowing of the lumen.

It is considered to be nearly always caused by local abrasions or injuries with the subsequent invasion by micro organisms.

The subjective symptoms are much the same as in the circumscribed variety only of greater severity, the pain in a well-developed case being so severe as to completely prostrate the patient.

The treatment advocated closely follows that of a furuncle, but in my experience incision is of doubtful value and better results have been obtained by the application of the X-ray at regulated intervals, the patient being kept in bed, his pain controlled by sedatives and suitable nourishment and general systematic treatment and nursing care established.

Numerous other less arresting inflammatory conditions arise in this canal as:

Acute Eczematous Otitis—exhibiting a primary stage with general redness, smarting and itching, a later stage of exudation and crusting, and treated, in its primary stage, by protection with a dry dusting powder, in its later stage by application of ointment, as bismuth, zinc, icthyol, etc., as the response of the parts indicates. Wiping away of the crusts is to be accomplished with the aid of the ointment and no watery solutions used.

Acute Haemorrhagic Otitis—usually occurring in the course of an influenza—an extremely painful affection with an acutely sensitive meatus, exhibiting blood blisters close to and often involving the drum membrane.

Dusting with dry boracic and the administration of sedatives is usually sufficient treatment, as these cases clear in 24 to 48 hours unless associated with a true Otitis Media.

Dermatitis—a superficial inflammation of the bony meatal wall with an associated myringitis is of frequent occurrence in certain subjects with a rheumatic foundation, especially at certain seasons of the year as in the late summer, apparently traceable to no other cause than a too sudden change of diet. In other cases it may be traceable to swimming activities.

It is accompanied not so much by pain as by a sense of fulness and discomfort and a certain degree of deafness.

The outer epidermal layer of the drum membrane and the skin of the canal is moderately thickened and inflamed and covered with moist, whitish desquimating plaques which curl and roll as they are removed, often exuding a foul odor and leaving the surface beneath bright red and sensitive. It is sometimes difficult to remove these plaques completely, especially in the anterior and inferior receding areas of the drum.

Hydrogen Peroxide is useful in this condition, facilitating the removal of the desquimating epithelium and aiding in the disinfection and healing of the surfaces.

* * *

There are still other inflammatory conditions which might be added to this list as—Herpes, Diphtheritic, Croupous and Parasite inflammations, but their rarety justifies their omission from what is meant to be merely a short review of some practical value to the student interested in aural conditions.

SPINAL ANAESTHESIA

ELLEN BLATCHFORD, M.D.

Before beginning the discussion of this fairly recent type of anaesthesia a word might be said in regard to its history. In 1884 the first lumbar puncture was done by Corning on a dog—and later on man. Bier was the first to use it for surgical purposes and after his publication there were many who proceeded to utilize it without stopping to consider indications or contra indications. As a result there were fatalities and the method fell into disrepute until some years later, when Babcock in America was the first to use it extensively.

Spinal anaesthesia is essentially a root block of the spinal nerves—both sensory and motor and is induced by the injection of the anaesthetizizng agent into the sub-arachnoid space. The spinal fluid is a diffusate from the choroid plexus and is absorbed into the lymphatics of the coverings of the brain and spinal cord. So the anaesthetizing solution in spinals is absorbed locally and has its affect on the cord and spinal roots with which it comes in contact.

There has been a vast amount of experimental work done on the subject in many countries, including our own. Dr. J. F. A. Johnston in the department of pharmacology in the University of Toronto presented a paper at the Academy in Toronto on his experiments with dogs and the following were some of his conclusions:

1. The greater the amount of novocain in a given volume of spinal fluid, the higher the anaesthesia.

2. Although mixing was a factor in determining the height of anaesthesia, the displacement of fluid was more important.

3. Gravity had a marked influence on the distribution of anaesthesia.

4. The chief danger was due to maralysis of the phrenic roots and not due to the anaesthetic agent entering the 4th ventricle, as was formerly supposed.

5. The phrenic roots were only affected by a concentration higher than that necessary to produce ordinary sensory anaesthesia.

Premedication.

In spinal anaesthesia as in other forms of anaesthesia, premedication of the patient is very important. In poor risks intravenous glucose or even transfusion may be used to improve the patient's condition before the operation. Morphine gr. ¼, hyoscine gr. 1/200 and atropine 1/150 given 1¼ hours before and nembutal grs. iii. one half hour before, is a very useful sedative. The morphine helps quiet the patient's fears and the atropine stimulates the heart. Then just prior to giving the spinal, ¾ gr. ephedrin given hypodermically prevents to a certain extent a serious fall in blood pressure following the spinal administration. The fall in blood pressure is due to relaxation of the vessel walls in the area anaesthetized. This relaxation is caused by the removal of the vaso constrictor impulses.

Administration.

The technique of administration is a very important factor in obtaining good results and waylaying uncomfortable after effects. On bringing the patient into the operating room, his blood-pressure and pulse are taken and charted and ¾ gr. ephedrin given. Blood pressure is taken every five minutes and there should be a rise of from 10 - 40 mm. from the action of the ephedrin. Then the patient is turned on his side (usually the left) knees drawn up on chest, head flexed on chest. In doing the lumbar puncture this position is very important—the back arched as much as possible and the spine in as

straight a line as possible. The next step is to decide in which interspace the puncture is to be made. A line running between the superior iliac crests passes between the third and fourth lumbar vertebrae. This is the one most commonly used, although one may go in higher for certain operations. The anaesthetist then scrubs—as if preparing to do an operation, donning sterile gown and gloves. The skin of the patient's back is prepared by using iodine followed by alcohol and then sterile drapes applied. A small area is anaesthetized with ½% novocaine in the interspace selected. A fine needle of 20-22 gauge is inserted at right angles to the skin in the mid-line. The needle passes through the supraspinous ligament, the interspinous ligament and the ligamentum subflavum—and by the experienced each of these can be felt, finally through the dura and arachnoid into the subarachnoid space. Extreme care should be used so that these membranes are not torn, and that the cord or nerves are not injured. If blood appears with the fluid a few drops should be allowed to escape, and if it still is evident the needle should be withdrawn and the puncture repeated at another level. Should this be blood stained also, it is wise to abandon the spinal and choose another type of anaesthetic.

The novocain used comes in sterile ampoules in crystalline form—ranging from 50 - 250 mgms. doses. Of course there are other drugs, but novocain is the drug I have used most. The top of the ampoule is removed, the stillette removed from the needle and the spinal fluid allowed to drop into the sterile ampoule. The amount of fluid used varies with the type of operation. When the desired amount is obtained the stillette is again placed in the needle to prevent the escape of the spinal fluid. The contents of the ampoule are drawn up into a 10 c.c. Luer Loch syringe and forced back again into the ampoule and drawn again into the syringe—to insure that all of the crystals have been dissolved. Then the syringe is attached to the needle in the spine and the contents forced into the spinal canal. A small amount may be withdrawn again to prove that the anaesthetic has been injected into the spinal canal and this is then re-injected and the needle carefully and quickly withdrawn from the spine. The patient is placed on his back and in the Trendelenburg position immediately. Novocaine is lighter than spinal fluid and this position is essential to prevent the Novocaine from reaching too high a level and also to prevent anaemia of the brain, the latter having caused death in a number of cases. The blood pressure is taken and recorded every 5 minutes and as a rule a fall in blood pressure is noted. If this fall becomes alarming a hypodermic of ½ c.c adrenalin and ½ c.c. ephedrin should be given. Should the pressure continue to fall this should be repeated and intravenous glucose begun at once. Usually the first hypo of adrenalin and ephedrin are sufficient to cause the pressure to begin its upward climb.

The length of time of anaesthesia depends roughly on the dose and should the operation not be completed when the spinal shows signs of wearing off, it is wise to start ether inhalation in abdominal surgery or N_2O in perineal or lower extremity operations. The patient should be kept in Trendelenburg for 2 hours after administration and care should be taken to change position slowly from steep Trendelenburg to one of a lesser degree.

Indications.

Among the most outstanding indications for the use of spinals are the chest cases in which surgery is imperative. We all have a horror of giving an inhalation anaesthetic to a patient with some chest condition. The relaxation of the abdominal muscles is a boon to the surgeon—intestines are contracted and fall away from the abdominal wall, assisting materially. There is, therefore, less handling of viscera and less shock. Spinal anaesthesia is used with great success in intestinal obstruction.

In acute inflammatory abdominal conditions it makes the surgeon's task very much easier beside eliminating post-operative vomiting or other disturbances of the digestive tract.

There are two main contra indications to its use:

1. General physical condition poor and resistance to shock therefore at a minimum.

2. Idiosynerasy for the drug.

Patients with myocarditis and aortic lesions are especially poor risks for spinals. Patients with too high a blood pressure or too low a blood pressure are not good subjects. Local disease of the spine with pathological spinal fluid also precludes its use.

Complications.

The complications possible I have listed with their treatment as follows:

1. The most common is the post operative headache. Many writers believe these can be prevented and if they do occur, can be relieved. These headaches are divided into lumbar puncture headache and meningitic headache. The lumbar puncture headache is believed to be due to tearing of the dura causing slow leakage of spinal fluids and is usually occipital and parietal occurring in 1st 24 hours increasing in intensity. Anampoule of pituitrin and ¾ gr. ephedrin will often relieve mild cases. Severe cases can be relieved by 100 c.c. 0.5 % solution of sod. chl. intravenously. Fluids should be forced. The meningitic headache is a result of poor technique and results from meningitic irritation—accompanied by photophobia and stiff neck. Treatment is frequent lumbar punctures and intravenous 10% glucose.

2. Vasomotor paralysis and fall in blood pressure is the most dreaded complication and can be prevented to a certain extent by the use of ephedrin preoperatively, use of Trendelenburg position, intravenous saline which might have added to it 1 min. of. 1:1000 adrenalin per 100 c.cs. One may give cracked ice by mouth and O_2 and CO_2 inhalations. If patient is nauseated one may hold patient's nostrils and have him breathe forcibly through his mouth. If the pulse remains imperceptible and there is danger of cardiac or respiratory failure, begin artificial respirations.

3. Respiratory paralysis—a slight respiratory depression may occur due to anaemia of the brain without any paralysis. This clears up as a rule as the pressure improves. Respiratory paralysis is indicated when the respirations slow gradually and is due to high anaesthesia and varies with the height and concentration of the anaesthetic and the vitality of the patient and vigilance of the operator. Sudden respiratory failure, the most dangerous, is due to lumbar puncture and occasionally occurs in patients of the status lymphaticus type. Unfortunately these cannot always be detected before operation.

4. Shock and syncope—may be produced in six ways:

(a) lumbar puncture or meningeal reflex—may occur in nervous patients who have had insufficient morphine.

(b) visceral reflex shock — occurs when stomach or intestine are pulled upon and may lead to nausea and vomiting. CO_2 and O_2 inhalations are indicated here

(c) hypersusceptibility with symptoms of anaphylatic shock and to be treated for collapse.

(d) position shock occurs most often in old and weak patients. The patient who is too quiet should be watched closely for shock and not subjected to sudden changes in position.

(e) intracranial pressure shock or lumbar puncture death occurs in cases of brain tumour. It is due to suppression of the medullary centres and symptoms are those of severe intra cranial pressure.

5. Meningitis — irritative and is due to rupture of blood vessel or dura. These patients have headache, backache and stiffness of neck. The meningitis may be purulent and due to faulty technique. It must be remem-

bered that a spinal puncture must be done with the same aseptic precautions as any surgical operation. As a rule the meningitis tends to clear up spontaneously in 10-15 days with no after effects.

6. Neuritis and palsies come under two classes—those due to trauma at the site of puncture and those due to damage at a distance. The latter occur during the 2nd week after operation as a rule and after about 10 days retrogress and finally clear up. The nerve usually affected is the abducens and results in photophobia and diplopia. Some writers believe this nerve has a special susceptibility to the drug.

7. Nausea and vomiting may be due to cerebral anaemia, occurring in first 15 minutes or to psychic disturbances or to reflex disturbance.

These complications sound rather awesome and would probably leave one with the impression that spinal anaesthetics are not safe. Most of the complications I have mentioned are very rare and the ones that do occur are not serious in the hands of the experienced. Special anaesthesia has made a place for itself and has its own very definite advantages in selected cases.

WOMEN IN MEDICINE

HARRIOTT I. GATES, '34.

"Medicine is no profession for woman." So often does the medical woman hear that said, but never can it be, by one who has honestly considered the progress of the human race or the evolution of medicine.

In literature we find abundant evidence that women have practised medicine from the earliest times when amongst primitive people they often combined the offices of priestess and doctor. In Mediaeval times positions were held by hundreds of women physicians and surgeons, and except for two hundred years ushered in by the Reformation when the status of women fell to its lowest ebb, women have always been recognized as combining in their character and nature the very difficulties which go to the making of a successful physician and surgeon.

The earliest surgical technique and the beginnings of scientific therapeutics came from the Greeks, and were in the hands of women. Galen, a famous ancient Greek physician, speaks highly of Margareta, who was an army surgeon, and of Eugerasia, who had a good remedy for nephritis. He used the remedies of Fanilla and Originia for haemoptysis and dirrhoea.

A study of the aborigines shows that women were the natural healers, the only obstetricians; it was their duty to gather herbs for the easing of pain, to drain a sore spot, to chant the incantations for exorcising the demons of sickness. Only when a louder noise was needed to scatter demons was the so-called medicine-man useful.

Later in the role of representatives of their goddesses women were almost divine. In Assyria, Ishtar was the goddess of medicine (4000 B.C.), while Gula, the goddess of death and resurrection, was frequently called the Chief Physician. In Egypt, Isis was the great goddess of Medicine. Sekhet, wife of the medical god Ptah, was the famous bone-setter and therapeutist.

For thousands of years in **Egypt** women were admitted to the medical schools regardless of their preliminary training. As early as 1500 B.C. records show that women students attended the Medical School of Heliopolis. The famous school at Sais was a woman's college where gyneacology and obstetrics

were specialties. An inscription: "I have come from the school of medicine at Heliopolis and have studied at the women's school at Sais, where divine mothers have taught me how to cure diseases." Herodotus of the fifth century B.C. wrote that these women were especially skilful with their stone knives and also in the use of splints for setting bones. Such instruments were used by the wife of Moses (1200 B.C.), and the women of Homer's time (800 B.C.), who were surgeons as well as midwives and general healers. The first woman doctor described in Egypt practised about 2730 B.C. during the reign of Queen Neferirika.

Among the **Greeks** were celebrated women physicians such as Originia, Aspasia, Agamede and Agnodice.

"Agamede, with the golden hair,
A leech was she and well she knew
All herbs on ground that grew."
—Odyssey.

Homer refers to Helen of Troy as the "physician which outweighs many others in value," and speaks of her knowledge of pain subduing drugs. The first medical work by a woman that has come down to us in a Greek treatise on disease of the uterus. It is said that Philista "wrote medical books, and was a professor of medicine"; that Lais, a contemporary of hers, reported a cure for epilepsy by an attack of malaria.

When Corinth fell in 146 B.C. and hundreds of women were taken prisoners to **Rome** and sold as slaves, medical women brought the highest prices in the market and were put in charge of orphan asylums and private hospitals on great estates, such as those of the Emperors Hadrian (76-138 AD.), Antoninus Pius and Marcus Aurelius (161-180 A.D.). Celsus complained that these private hospitals were better than those for the general public. These women have become the predecessors of some of the best medical women of modern times, for Dr. Mary Kalapothakes of Athens during the last Great War proved herself to be a worthy follower of these early Grecian women.

At the time of Julius Caesar, medical women were known as Medicae Obstetricae and Sagae. Galen praised Antiochia, a specialist in diseases of the spleen, arthritis and sciatica. A statue was erected in appreciation of her medical ability by the city of Flos in Asia Minor. Also a medical treatise was dedicated to her in 75 A.D. by Heraclides, the greatest of the empirics.

During the middle ages there arose a feeling of feminine inferiority, which was intensified by the Church, and the education of women was neglected. Even then midwifery was left entirely to women; blood-letting was not permitted to the clergy, so women were taught to do minor surgery. Housewives gathered herbs, prepared medicines and bound up wounds. At this time Fabiola, a nurse and physician, was prominent. In the sixth century a woman, Theodora (527-566), founded many hospitals on the continent. In the seventh century at the Benedictine convents for women — which spread through Italy, Germany, France and England—a girl's education was not considered complete without an elementary knowledge of medicine and that part of surgery that deals with wounds. The famous Abbess, St. Hildegarde, skilled in the arts of medicine and surgery, wrote two important works: "Liber Simplicis Medicinae" and "Liber Compositae Medicinae." These convents became the out-patient departments and hospitals of the surrounding districts.

In the eleventh century the medical school of Salerno in **Southern Italy** was early in its history opened o women students several women being on the staff. Soon the department for women's diseases was entirely under the direction of women; from this developed the Salernitan School of Women Physicians. Many text-books were written. "De Morbis et eorum Curae" was written by Trotula; "On Crisis in Pestulent Fever,"

by Mercuriade; "On Fever," by Rebecca Guarno, and "Black Bile," by Abella. A woman doctor was at the head of the Department of Anatomy in Bologna for nineteen years. She invented the use of wax models for teaching purposes, and through this became known all over Europe. One of her assistants, a young woman called Giliane, was the first to inject the blood vessels of an anatomical specimen to preserve them.

In 1292 in **Paris** there were eight women doctors practising. In the days of King Edgar women in **England** were entitled by law to practise medicine, and references to women surgeons appear in an edict of King John in 1352. But in 1421, as a result of a petition sent by their male competitors, Henry V. repealed the law and women were forbidden to practice under pain of imprisonment; exceptions, however, were made, such as Anne Hasket, who practised among the poor. She was consulted by people even from the continent and was thanked by the king for her care of the wounded after the battle of Dunbar.

In the first part of the eighteenth century Catherine Bowler became known for her knowledge of the treatment of hernia. In 1735 Jane Stephens discovered a remedy for "stone," which aroused much interest in England; the government in 1740 paid £5,000 for her secret remedy

In **Spain** women doctors date as far back as the ninth century, the most celebrated practising in the fifteenth and sixteenth centuries Olivis Sabuco, perhaps the best known, published a book in 1588. The Countess of Chinchon introduced the use of cinchona bark for the cure of malaria (1640).

In **Switzerland** Mdme. de Helden was the first to remove a piece of steel from the eye with a magnet; she planned several other operations, the technique of which is still followed to-day. In Europe as well as America the 19th century was marked by steady advances of medical women under the leadership of such women as Dr. Elizabeth Blackwell, Mrs. Garratt Anderson and Dr. Sophia Jex Blake.

By a vote of the class of 1847 Miss Blackwell, who had applied in vain for admission to many American medical schools, was permitted to enter the Geneva Medical College of New York. Two years later she graduated with honours and returned to London and Paris for further study. Hers was the first woman's name to be placed on the medical register in England (1859).

In England, after having been refused admission to every medical school, Miss Garratt trained for a nurse in the Middlesex Hospital; later she was allowed to attend lectures and dissecting classes as a great favour. In one of the examinations she obtained the highest honours, and was immediately forbidden to attend any more lectures. A similar fate befell another woman at Edinburgh. Scholarships were given to men only. Every obstacle possible was thrown in the way of these women who wished to gain a medical degree; every slightest advance met with bitter opposition.

Dr. Sophia Jex Blake obtained registration in Britain and founded the School of Medicine for Women in 1874. Shortly after this, women students were admitted to the wards of the Royal Free Hospital, the only school in England which would receive women until the Great War. Then, when the demand for doctors became so great that all but four colleges opened their doors, the numbers of women medical students greatly increased, and all gave valuable service during the war. The work carried on by the women among the soldiers in the hospitals won great praise and the status of women as physicians was raised.

In 1920, however, all schools except two—the London School for Women and the University College Hospital School—were again closed to them. Finding it difficult to obtain internships women have organizezd many schools and hospitals of their own. The

first of these, the Elizabeth Garratt Anderson Hospital, was opened in 1861.

In 1876 the Irish College of Physicians and the Queen's University of Ireland admitted women to examinations and diplomas on the same terms as men.

Paris first opened its University to women in 1868; Russia in 1860. In India there are 146 hospitals staffed entirely by women in addition to numerous hospitals run by Missionary Societies.

The first college in the world in modern times for the medical education of women—the Women's Medical College of Pennsylvania—was founded in 1850; five years later the New York Dispensary for Poor Women and Children was opened to give women an opportunity of consulting physicians of their own sex. In 1875 there were six hospitals in the United States staffed entirely by women physicians; in 1893 about one hundred and thirty institutes had appointed women physicians and surgeons to their staff. In 1910 there were 13,687 women doctors in the United States. Johns Hopkins admitted women in 1893; Cornell in 1899; Pennsylvania in 1915; Columbia in 1916; McGill in 1918. There are now sixty-three Class A schools in the United States that admit women as medical students, sixty-two of which are coeducational.

In Canada Mrs. Emily Howard Stowe was the first licensed woman doctor. She graduated in the States in 1867, then returned to Canada to practise. Her daughter, the first woman to graduate from a Medical College in Canada, received her diploma in 1883 from the School of Medicine at Toronto. Her portrait now hangs upon the walls of the Academy of Medicine. Women were admitted to the study of medicine in Quebec in 1890 All Medical Colleges in Ontario, with the exception of Queen's University, are now open to women students.

To-day many women are engaged in the field of research, and numerous fellowships have been awarded to them. Many names are outstanding, such as Dr. Maude Abbott of McGill, for her well-known work on heart; Dr. Lydia Rabonovitch Kempner, whose work on tuberculosis is world famed; Dr. Florence Sabin, Professor of Histological Anatomy at Johns Hopkins; Madame Curie, famous for her work with radium. Recently Dr. Helen McMurchy, formerly head of the child welfare division of the Dominion department of health, was made a commander of the order of the British Empire.

Thus we see down through the ages from the Babylonian period, through the ancient Greeks and Romans to modern times woman has always been connected with the medical profession, and there have been definite waves of influence upon the pharmacopoeia, surgery, obstetrics, gynaecology and every branch of medicine. How can any one in these enlightened days say that medicine is no profession for a woman!

RESPIRATORY DISEASE IN CHILDREN

GLADYS L. BOYD, M.D.

The upper respiratory tract is of great importance, not only because of its own proneness to infection but also because of its effect, when diseased, of both initiating and protracting diseases of the bronchi and lungs.

Tonsils and adenoids are the commonest and most easily recognized and treated foci of infection. Before condemning tonsils, evidence that they are diseased should be demonstrable. Simple hypertrophy, unless so gross as to interfere with the intake of air or food, is not sufficient cause for tonsillectomy. Frequent attacks of tonsillitis or signs of chronic infection such as red pillars, adhesions between these and the tonsils, pus in the latter, and cervical adenitis render removal of the tonsil imperative.

Excessive adenoid tissue should be removed as soon as possible after its discovery. This is because of the effect of such enlargement on the general health, both physical and mental and the likelihood of its resulting in either middle ear or sinus disease.

Acute Tonsillitis may occur at all ages. In infants a retropharyngeal abscess rather than quinsy complicates severe attacks. The development of such abscesses is accompanied by typical symptoms, in addition to the increase in fever and toxemia from which the patient is already suffering. Swallowing becomes difficult or impossible, the breathing is noisy and the head is retracted. Palpation of the infected area gives more information than inspection, both as to the presence of the abscess and the proper time to open it. Many undoubtedly open spontaneously and the contents are expelled or swallowed with no ill effect. The possibility that aspiration will occur and pneumonia or lung abscess result make surgical opening with the child in suitable position to avoid aspiration of any contents the only safe plan. Quick relief and recovery follows the evacuation of the pus.

Acute Sinus Disease is the only type of this disease that has been recognized in children up until the past few years. Even yet the prevalence and effect of chronic infections of the maxillary antrums and ethmoid cells is not fully appreciated. This is due largely to the difficulties in both diagnosis and treatment of this trouble in the young. Such infections should be looked for in all diseases in which removal of focal infection is an important factor in treatment. They should be suspected if the removal of the more obvious foci, such as diseased teeth and tonsils, has not been attended with the expected improvement in the patient's condition. Nasal obstruction and frequent or persistent head colds are often complained of but their absence does not rule out sinus infection. Localizing symptoms are often entirely wanting. For diagnosis, thorough nose and throat examination and good radiographs are essential and at times diagnostic puncture of the antrum and examination of the washings is needed. In young children palliative treatment such as repeated lavage is the only treatment possible, because of the anatomical relationships of the eye sockets and teeth, but this is usually attended by good results.

Laryngitis is common in children. The smaller, less developed and more vascular and more easily compressed larynx is more apt to produce alarming symptoms such as croup. Certain individuals are peculiarly susceptible and respond to every nasopharyngeal infection in this way. It must be differentiated from laryngeal diphtheria, and where there is any doubt regarding its etiology antitoxin should be given. Warm moist air such as that

obtained from the use of a steam kettle is necessary. Hot and cold applications to the throat help relieve the soreness. The household remedy of an emetic such as wine of ipecac is good, as it relieves the stomach of any excessive food and helps rid the child of much tenacious secretion. Should symptoms persist and become more alarming, intubation or tracheotomy may be needed.

Bronchitis is an extremely common sequel to nasopharyngitis in children. The symptoms vary from only slight ill health to those of sufficient severity that the disease is only differentiated with difficulty from bronchopneumonia. Certain of the worst cases in which the small bronchioles are affected, so-called capillary bronchitis, show post-mortem a patchy consolidation about the diseased bronchi. Chronic or recurrent bronchitis, other than the allergic type, which persists after nasopharyngeal infections have been removed, should suggest the possibility of bronchiectasis being present.

Treatment consists first in prophylaxis, both general hygienic measures and local eradication of focal infections. During the acute attack, bed, warm moist air from a steam kettle and local irritation as furnished by repeated applications of mustard pastes is usually all the treatment needed. Aspirin, alone or with Dover's powder may be given as a sedative if the child is nervous, restless or prevented from sleeping by an irritating cough. Expectorant mixtures containing potassium iodide are useful when the chest is full of dry rales and the secretion tenacious. In infants with capillary bronchitis, cyanosis and prostration are frequently alarming. Mustard baths and hypodermic administration of adrenalin help the latter and the former is much improved by placing the infant in an oxygen tent.

Pneumonia is a common disease of childhood. Its type is determined more by the type of child than the nature of the infecting organism. Thus undernourished or rhachitic children are prone to develop bronchopneumonia while lobar more often attacks the healthy child. Both types are secondary to upper respiratory infection although this may have been so mild as to almost escape notice.

Sudden onset of lobar pneumonia in children is rare, even in older children. Persistent vomiting early in the disease is common. The usual symptoms are fever, usually high, dyspnea with an expiratory grunt, and often pain. The latter may be referred to the precordium or abdomen and of sufficient severity to suggest pericarditis or appendicitis. Apical pneumonia, particularly right-sided, is usually associated with a greater degree of toxicity and nervous symptoms, such as meningismus, neck rigidity and stupor. Cough is not usually bothersome. There is little expectoration and this is never rusty. Cyanosis is rare. The temperature curve is variable. It falls by crisis in about 80 per cent. of cases and by lysis in the others. Lobar pneumonia usually runs its course in four to seven days.

Signs of consolidation with a lobar distribution are the usual ones. In certain cases, physical signs are lacking until the course of the disease is well run, so that a symptomatic diagnosis must be made. Practically all uncomplicated cases recover. Empyema is the commonest complication. Its likelihood is suggested early in the disease if pleural pain has been severe or persistent.

The treatment in most cases consists of good nursing. Fresh cold air and the counterirritation of mustard pastes make the patient more comfortable. When the causative organism is typed and proved to be of a group for which serum is available, the administration of the latter is undoubtedly helpful.

Bronchopneumonia occurs more frequently in poorly nourished or rachitic children. Certain infections such as measles and influenza may cause its

development in anyone. Bronchitis is often present first and the onset of pneumonia is indicated by a rise in temperature and the increase in toxemia and leucocytosis. The signs may differ little from the previous bronchitis or there may be patchy consolidation not confined to any one lobe. In influenzal pneumonia the consolidation may be so great as to suggest lobar pneumonia. Cyanosis is common. Spread of disease associated with collapse and increased cyanosis are danger signals. Empyema is a frequent sequel. Lung abscess and bronchiectasis occurs. Its course, even in favourable cases, is more protracted than lobar pneumonia. The mortality is high, particularly in babies. It decreases in older children and in private practice.

Prophylaxis is the best treatment. This consists essentially in promoting good general hygiene and particular care of infectious foci in the nose and throat.

Warm, moist air is helpful. In the badly cyanosed, the oxygen tent is the best place to put the child. Stimulation is necessary. This may be given in small doses, 20-30 minims of brandy or whiskey every four hours. Should collapse occur, hypodermics of adrenalin may be needed. Hydrotherapy, such as tepid sponges, is the best treatment of the pyrexia. Sufficient rest must be secured and small doses of codein or Dover's powder may be given to insure this.

Empyema is usually a sequel to pneumonia and is most frequently either pneumococcic or streptococcic in type. Occasionally it results from the rupture of a lung abscess or penetration of the lung by a foreign body. Its onset following pneumonia is apparent from the rise of temperature, particularly of a septic type, and the increased toxaemia of the patient. The most reliable physical signs are the flatness of the percussion note over the fluid and the displacement of the mediastinum to the opposite side. The latter may be demonstrated by the displaced apex beat or by the deflection of the trachea as it is palpated in the episternal notch.

Drainage is of course essential. The best means to achieve this, particularly in babies, is not so simple. Infants do badly with open drainage and so frequently recover with repeated aspirations, that the latter should be tried. For older children, rib resection and suitable drainage should be done as soon as the pus is thick. Until such time as this occurs, repeated aspirations should be done to relieve the patient and allow the displaced mediastinum to return to its normal position.

* * * *

Non-purulent, uninfected pleural effusions are fairly common. These are usually tuberculous, and less often rheumatic. Tuberculous effusions resorb fairly quickly and only sufficient fluid for diagnostic purposes should be aspirated, as removal of large amounts may cause the development of miliary tuberculosis. Rheumatic ones should be aspirated if causing cardiac embarrassment.

Lung Abscess is usually the result of broncho-pneumonia, aspiration of infected material at an operation, or aspiration of a foreign body. They vary in size from the miliary ones found after death from influenza or pertussis, to those the size of a small orange.

Definite physical signs and much foul sputum may be present to make the diagnosis easy. Both may be absent. If the bronchus to the diseased area is plugged sputum is lacking and often the only physical signs are slight dullness and deficient air entry over the abscess.

Surgical drainage, pneumothorax and bronchocopic suction are the usual methods of treatment. The last appears the best in all acute cases. It allows examination of the bronchi to the diseased area and search for a possible foreign body which may have

been unsuspected. It is usually possible to establish adequate drainage by this means, and after a varying number of such aspirations, care is accomplished. Abscesses of long standing usually prove to be bronchiectatic and there treatment is that of the latter disease.

Bronchiectasis, until a few years years ago, was considered rare in children. Better diagnostic methods have now placed it among fairly common diseases. Several factors are necessary for the development of bronchiectasis. They are: (1) Congenital or acquired weakness of the bronchial wall which makes dilation easy to produce. (2) Partial pulgging of a bronchus to this area. This may be intrinsic such as a foreign body or tenacious secretion, or extrinsic, as pressure of enlarged mediastinal glands. (3) Infection must be present both locally and in the nose and throat.

Bronchiectasis should be suspected in chronic bronchitis, unresolved pneumonia and when a foreign body has been in the lung for some time. The diagnosis should be made by bronchoscopic examination and the injection of lipiodol through the bronchoscope. This should be carried out under general anaesthesia. It permits visualization of the bronchi to the affected area, discovery and removal of any foreign body and removal of secretions, so that lipiodol may reach the actually diseased area.

Treatment consists in emptying the cavities and keeping them thus. This is done by repeated bronchoscopic suction in very mild cases and in extensive bilateral ones, in which other forms of treatment are impossible. In severe unilateral cases, the lung should be collapsed either by pneumothorax or phrenicotomy unless adhesions are present. Postural drainage is a useful adjunct in the treatment of all cases, but is not adequate alone. Lobectomy is indicated in extensive unilateral cases in which collapse of the area is impossible because of adhesions and suction needed too frequently. Clinical cures are obtained by all of these means.

Tuberculosis in childhood presents different problems than this same disease in adults. They may perhaps be better appreciated if one regards this disease as an acute infection, with a period of infection, incubation and later, invasion of the tissues. Many cases are not seen until the disease is fully developed, but recognition of the preliminary stages might avert disease if proper precautions were taken.

The fact that during the period of incubation, there are no symptoms, unless slight fever, no signs and often a negative reaction to tuberculin, make one see the importance of a history of contact. All contacts, particularly infants should be regarded as potential cases until repeated tests and examinations after the discontinuance of contact, make it certain they have not been infected.

If after exposure to infection a few organisms find lodgment in the body a definite course of events follows. In human contact cases the bacilli usually settle out in the peripheral portion of the lung. Reaction to wall off these organisms starts. It may be so insignificant as to produce no signs nor symptoms at the time. The tuberculin test becomes positive and often some considerable time when calcium has been deposited, this primary focus is shown in a radiograph as small calcareous nodules in the periphery of the lung. The mediastinal glands which drain the affected area may be enlarged. Larger reactions of two types occur about the primary focus. One, the so-called exudative type, or epituberculosis, usually subsides without any treatment. Unfortunately it is impossible without a perod of observation to be sure whether the lesion is of this type or the second more serious lesion. This consists of an actual caseous pneumonia which may go on to cavitation or cause widespread infec-

tion in the surrounding lung. Sometimes the reaction set up in the glands draining the diseased area is severe, and results in extensive caseation.

Aside from these local reactions, organisms may escape from the primary focus into the blood stream and cause miliary tuberculosis, tuberculous meningitis or bone tuberculosis. Certain infections such as measles, pertussis and influenza may activate a primary focus and cause miliary tuberculosis or caseous broncho-pneumonia. Adult tuberculosis may develop.

The diagnosis of tuberculosis in children must be made on other than the physical signs produced, as these are at best uncertain and are often lacking, even over a demonstrable lesion. The following factors should be considered. They are given in the order of their relative importance: (1) History of contact. (2) Biological tests such as the intracutaneous tuberculin one. (3) Symptoms. (4) X-Ray. (5) Physical findings.

The superlative value of prevention rather than attempted cure makes prophylactic treatment the best. Removal from all contact with the disease, and the careful supervision and reexamination of all contacts whether infected at first or not, are most important. Should the disease be already established, treatment will depend on whether or not activity is present. Rest and general good care may be all that is needed. In others with an extensive and increasing lesion, pneumothorax may prevent its spread and allow the establishment of a cure.

"ANNUAL MEDICAL AT-HOME."

The first convalescent clinic for patients suffering from "Chronic Duck's Disease" was held at the Royal York Hotel, January 26th, 1934.

The new treatment was conducted by the Medical Society Executive, under the leadership of Roy G. Clark (Senior Clinician-Emeritus). Much of the success obtained was due to the untiring efforts of Mr. Clark, who capably directed the treatment from beginning to end. He was ably assisted by members of the executive, who helped to make it a success.

The clinical treatment consisting of proper environment, diet and spirit, was more than adequate in combatting this serious disease.

The Medical Undergraduate Body are pleased by the splendid results, which must be more than gratifying to Senior Clinician Clark, on the first successful treatment of that dread malaise, "Chronic Duck's Disease."

N.B.—The second clinic for this ailment will be held at the Royal York Hotel some time in January, 1935.

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THE CORONARY CIRCULATION

JESSIE A. McGEACHY, '37.

As far back as the dim stretches of history have been followed, man has been amazed at the mystery of life. The hidden springs of power in the human body have afforded an ample field of speculation for the necromancer and medicine man as well as for our present day scientist. And not the least wonderful of these mysteries is the mechanism of the blood supply to the heart. The direct dependence of life on the oxygen supply of the heart muscle allots to the coronary circulation a tremendous importance in the investigation of anatomical and physiological problems.

What may be called the coronary circulation proper is well known to consist of the right and left coronary arteries, arising from the aorta in the anterior and posterior sinuses respectively. The right, by its main trunk over the surface of the right ventricle and by its numerous and variable branches, supplies most of the right ventricular and right auricular walls, as well as the anterior part of the interventricular septum. The left, arising under cover of the left auricular appendage, by its two large branches, the descending and circumflex, supplies the apex of the heart, the adjacent right ventricular wall, the left ventricular wall and part of the interventricular septum. In reality the territory of supply from the right and left arteries overlaps somewhat. The venous system comprises the branches of the coronary sinus, being the venae magna, media and parva and the posterior oblique veins, and, in addition, the veins which do not enter the coronary sinus. Of these we may mention the anterior cardiac veins entering directly into the right auricle, the right marginal vein, which sometimes opens into the right auricle directly instead of by way of the coronary sinus, and thirdly, the venae cordis minimae, which form in the substance of the myocardium and enter the cavity of the right auricle directly. These venae cordis minimae are the so-called Thebesian veins, about which there has been much recent discussion of function. They were named after Thebesius who demonstrated their existence by injection methods in 1708, although they had been previously demonstrated by Vieussens four years earlier. Contrary to the earlier teaching, there are no end arteries in the heart. On the other hand, there is an extremely rich anastomosis, which increases with age. Heart muscle has been shown to be supplied with about twice the capillary supply of skeletal muscle per square millimetre.

The physiological factors controlling the action of the coronary flow will not be dealt with here fully. The influence of the blood pressure is perhaps the most important. When the blood pressure is increased twice, the coronary flow is increased four times. The flow also varies directly with the amount of work being performed by the heart muscle, since increased oxygen usage of the muscle will increase the blood supply. The phases of the heart beat operate to vary the coronary flow, so that the vessels are being filled during diastole and are more or less completely emptied during systole. Thebesius postulated that this was because the flaps of the semilunar valves in systole shut off the coronary circulation. This idea is not now accepted, but rather the fact that the great pressure of contraction would clamp off the coronary circulation at the height of systole, is offered as an explanation of this observation. The average amount of blood flowing through the coronaries of a man at rest is 140 c.c. per minute. The fact

that the canular method of measurement demonstrates that only sixty per cent. of this volume (or 84 c.c.) per minute flows through the coronary sinus, presents a problem which has puzzled physiologists for some time. What is the fate of the remaining forty per cent., and by what channels does it escape from the coronary vessels?

In addition to the coronary circulation described above, it has been long believed that there is an extensive collateral anastomosis which affords the coronary arteries direct communication with the heart chambers, apart from the intervention of the coronary sinus. This belief is forced to the consideration of physiologists by the fact that cases have been reported of hearts, which on post mortem examination showed complete occlusion of both coronary orifices, and yet the hearts had functioned adequately and normally throughout life. No additional compensatory arteries were found and yet the people had been able to go about in the usual fashion, even doing heavy work. Thus the problem arose of discovering the mechanism by which the heart muscle could receive sufficient blood to enable it to carry on normally, although the coronary orifices were non patent.

Four theories have been advanced to account for this compensatory circulation. The first is based on anastomosis. Within the heart itself this is very rich, and, in addition, an extensive extra-cardiac anastomosis has been demonstrated by Hudson, Moritz and Wearn, as occurring between the coronary arteries and the vessels of the mediastinum, lungs, parietal pericardium, both diaphragmatic surfaces, and the abdominal aorta by way of the vasa vasorum. The second concerns anastomosis between the Thebesian veins and the larger coronary veins, evidence of which has been established by perfusion experiments by Wearn, who estimated that as much as ninety per cent. of the arterial flow might escape into the Thebesian vessels. The third has to do with a backflow to the coronary veins from the right auricle, as demonstrated by Bateson and Bellet in 1930. The fourth is the theory which postulates direct communications between the coronary arteries and the heart chambers, to a discussion of which the remainder of this article is limited.

Investigations of this problem date back to the time of Vieussens in 1704 and have continued until the present. The conclusions have been contradictory and varying. Some believed, in agreement with Vieussens, that there were communications between the coronary arteries and the heart chambers; others, in agreement with Thebesius and anatomists of his day, that the communications were only by means of venous channels; still others did not agree with either of these ideas. These various conclusions were all based on experimental work, which varied so widely in technical method that there was little concerted opinion on the question that could be considered conclusive. Considering this state of affairs, and having observed examples of double coronary occlusion in functionally normal hearts, in 1928, Wearn and his colleagues set about to obtain some conclusive evidence on the question of vascular connections between the coronary arteries and the heart chambers.

Wearn's technique was to inject the chamber of the right ventricle and the lumen of the coronary arteries with a celloidin suspension, under pressure. Red colloidin was used for the ventricle and blue for the arteries. Following the injection, the muscular tissue was macerated with hydrochloric acid so that what remained was a red cast of the ventricular chamber and blue casts of the arteries and their branches. Injection of the capillaries was not made, but the interesting observation was to see, in all final specimens, the red tipped ends of the arteries fused to the ventricular mass. This shewed that the celloidin had entered the tips

of the arteries from the ventricle, with which they must therefore have been in open communication. Similar work was carried out which shewed the branches of the veins communicating with the ventricular cavity. Wearn next described the histological structure of these communicating vessels, by removing a block of tissue, which was invaded with the injected vessels, serially sectioning and reconstructing it. The net result of this work was an identification of two distinct groups of vessels connecting the coronary arteries with the heart chambers.

The first group is formed by small branches of the coronary arteries losing all of their coats except the endothelium, becoming increased in diameter and of irregular lumen. These were named "arterio sinusoids," many of which combine to form a "myocardial sinusoid." The myocardial sinusoids anastomose freely with each each other and vary in diameter from fifty to two hundred and fifty micra. They may have capillary branches, and they finally empty into the heart chamber either separately or by way of a "common opening" with several others. Their appearance when closed and empty resembles strands of fibrous tissue and sometimes may be identified as vessels only by the presence of erythrocytes within the lumen. Their walls are similar to capillary walls and their close contact with muscle fibres indicates their role in supplying parts of the heart with blood. The second type of communicating arteries run more directly from the coronary arteries to the tissue of the ventricle. These are called "arterio luminal" vessels and differ from the sinusoids in possessing thicker walls. Diameters of these vessels were estimated at 0.2 to 1.0 millimetres. Wearn demonstrated twenty to twenty-five such small arteries entering the ventricle directly from the larger coronaries.

These experiments afford evidence for concluding the existence of extensive collateral anastomosis which acts as a safeguard to the coronary circulation proper. A resumé of these alternative routes of blood flow from the coronary arteries is as follows:

1. Extra cardiac anastomosis occurs between the coronary arteries and the vessels of the mediastinum, lungs, parietal pericardium, both diaphragmatic surfaces and the vasa vasorum of the abdominal aorta.

2. **a.** Capillaries and veins enter the right auricle through the coronary sinus or the great cardiac vein.

b. Capillaries and veins enter the heart chamber through the Thebesian veins.

3. Arterio luminal vessels join small branches of the coronary arteries to the heart chambers.

4. Arterio sinusoidal branches of the coronary arteries form myocardial sinusoids which enter the heart chambers directly.

The last three systems anastomose with each other.

These routes would seem to indicate an adequate explanation of the mechanism by which a heart with completely occluded coronary orifices can still be supplied with blood to carry on its work. The arterio sinusoidal network affors a great additional source of oxygen supply to the muscle, beyond that provided by the capillaries. These alternative routes for the coronary flow would also serve to explain the disposal of the mysterious forty per cent. of the blood from the coronary arteries which does not enter the right auricle from the coronary sinus.

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VISUAL PURPLE

JEAN F. DAVEY, B.A., '36.

When light with a wave-length corresponding to any part of the visible spectrum strikes the eye, the act which we have named "seeing," results. Since the existence of the blind-spot in the eye has been conclusively demonstrated, it follows that light is unable to stimulate directly the fibres of the optic nerve, and there must therefore, be some mechanism or mechanisms whereby the energy of light is translated into energy of another kind, which passes along the optic pathway to the visual cortex.

Experiment has shown that the impulses originate in the layer of rods and cones, between the external limiting membrane of the nervous layer of the retina and the pigment epithelium. The rods predominate in this layer, except in the region of most distinct vision and discrimination of color, the macula lutea, and each consists of an outer and inner segment—the former containing the photosensitive substance, visual purple.

According to the Duplicity Theory of Vision, there are two distinct types of activity existing in the retina—a Scotopic mechanism, mediated by the rods, and concerned with the appreciation of light and movement, and which is achromatic, working with a low threshold of stimulus intensity, and therefore, being typically evident in conditions of dark adaptation; and a Photopic mechanism, mediated by the cones, which concerns itself with form and color vision, and which, with a relatively high threshold of stimulus intensity, is typically evident in the light adapted eye. This theory is based on anatomical findings. Each cone is associated with a separate nerve fibre, thus allowing greater discrimination in each individual stimulus, whereas several rods are associated together with one nerve fibre, and this prevents exactitudes, but allows summation of subliminal stimuli, thus increasing the sensitivity.

The fact that visual purple is reversibly bleached by light in the living eye, was first noted by Franz Boll in 1876, and his work led to the question, "Might not the mechanism whereby light energy is transformed into nervous impulses be one of photochemical decomposition?"

Practically all the work has been carried on in Germany, and, more recently, in the United States, in an effort to show an inter-relationship between the activities of visual purple and the visual processes, and some very interesting and significant results have been obtained. It was observed first of all, that acute vision is still possible after complete disappearance of visual purple, and therefore its function, if any, must be concerned with the perception of feeble light. In other experiments, a curve indicating the absorption spectrum of visual purple plotting arbitrary units against wave-length, was found to follow closely the luminosity curve of the human eye at low intensities, in which the degree of light required to stimulate vision was plotted against wave-length. Also, a curve showing the velocity of bleaching of visual purple at different wave-lengths, was found to parallel both of these.

Selig Hecht started his experiments about 1919, working first on two small animals, an Ascidian—(Ciona) and a clam—(Mya Arenaria) which he discovered had a photic irritability—responding to illumination by a graded and vigorous contraction of their protruding organs—syphons. Later, he used solutions of visual purple extracted from frogs' eyes, by means of bile salts. Such a solution is a clear purplish-pink, and bleaches irrevers-

ibly in sunlight to a yellowish color, in about one second. He stated that a photosensitive substance undoubtedly exists in the irritable elements of the eye, and its decomposition by light forms the first step in the receptor process. He postulated a simple monomolecular reaction—in which one molecule of the substance is broken down into two simpler molecules—and, in the dark, recombined. He believes that the unknown substances formed, either themselves stimulate the visual end-organs, or catalyse a chemical reaction, whose products do. The latter was shown to be the case as far as the starfish and mollusc were concerned. He showed that their reaction time to light consists of a sensitization period, during which the animal must be exposed to light, and a latent period, during which it need not be illuminated —and he concluded that this latent period represents the secondary chemical reaction necessary to stimulate the nerve fibres, and which is catalysed by the products of the photochemical reaction.

Hecht supported his theory by showing that the curves indicating the velocity of bleaching of standardized solutions of visual purple followed the curve plotted from the equation of a simple, monomolecular isothermic reaction. He also showed that the velocity constant of the bleaching reaction, with all other factors constant, is a linear function of the intensity of the stimulating light.

Boll had observed that the visual purple in the eye, when bleached by light, reappeared slowly in the dark, and that regeneration required the presence of the pigment epithelial layer of the retina. Under the same circumstances, the eye becomes dark adapted —a phenomenon of dim vision, and associated, according to the Duplicity Theory, with the rods—so that it seemed probable that regeneration of visual purple might be responsible for dark adaptation. Following up this thought, Katherine Tansley carried out work in the United States in 1931, on the regeneration of visual purple, and showed that, as Hecht had stated in his theory of a simple reversible reaction, the figures obtained fitted accurately the curve plotted from the equation of a bimolecular isothermic reaction, that is—two molecules combining to form one more complex molecule. The data on the dark adaptation of the human eye, from the experiments carried out in Germany at the beginning of the investigation on visual purple, were then plotted, and they also were found to conform for a bimolecular isotherm.

The regeneration experiment was also carried out with animals deficient in Vitamin A, since this is known to be a cause of night blindness—or failure in dark adaptation. It was found, however, that the regeneration was merely retarded by the Vitamin lack, and if left several hours longer, the animals so affected attained the same complete degree of regeneration as did the normal animals.

Efforts to determine the chemical nature of visual purple, and isolate it as a pure substance, have, to date, proved fruitless. It is considered to be in solution in the outer segments of the rods, and to be secreted by the pigment cells of the adjoining epithelial layer. It is unlikely that it is a mixture of a number of substances, since its exposure to monochromatic light does not bring about the dissociation of any one component, leaving the others unaffected. It is not digested by trypsin, therefore it is probably not protein in nature. Its color, and hence its absorption spectrum, differ in different annals—it is reddish-violet in frogs, purple in mammals.

The work that has been carried out already along this line, seems to lead to several very significant conclusions. The visual purple is, in the living eye, bleached by light, and regenerated in the dark, and its activity is consonant in every way so far investigated with the visual reactions to light of low intensities. The bleaching process is a

direct and simple protochemical process, and the threshold energy quantum just sufficient to excite the bleaching effect, is practically the same as the limit of senstivity of the retina. The bleaching follows the kinetics of a simple monomolecular reaction, whereas the regeneration follows that of a bimolecular reaction, and corresponds to the process of dark adaptation.

There remains much to be done, both in this field and also in connection with the mechanisms involved in the transmission of form and color vision at high intensities of illumination, as carried on by the cones. A somewhat similar photochemical process has been suggested to account for this reaction, although the substance or substances involved are not known. Hecht does not think that visual purple is concerned in this process, but, rather, substances which may be chemically very closely related to it. In any event, the field is comparatively wide open, and future investigations along either of these lines, should prove extremely interesting.

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SUBACUTE COMBINED DEGENERATION OF THE SPINAL CORD

JESSIE GRAY, B.A., '34.

In pernicious anaemia and in certain rare secondary anaemias such as that following infestation with Bothriocephalus Latus, a degenerative condition develops in the spinal cord known as Subacute Combined Degeneration of the Cord. This condition presents a distinct pathological entity consisting essentially of a swelling and vacuolar degeneration of the myelin sheaths of the nerve fibres in the posterior columns of white matter with practically simultaneous cork-screwing and fragmentation of the axis cylinders themselves. This process develops in patches throughout the posterior columns beginning in the thoracic region and spreading to coalesce with other degenerative plaques above and below until it extends the whole length of the spinal cord and even up into the brain stem. It also spreads laterally around the cord to coalesce with foci of degeneration which develop in the lateral and ventral columns of white matter at a later stage, and eventually a ring of degeneration surrounds the grey substance of the cord.

Some say that this process of swelling and fusing of the degenerate myelin sheaths to produce the honeycombed appearance of so-called Lückenfeldern is quite distinct from all other degenerative processes in the body in the untreated case of pernicious anaemia by reason of the absence of any fibrosis. They attribute this phenomenon to a specific property of the neurotoxin which they hypothesize to be the cause of the process in

the cord, this property being an actual inhibitory effect on gliosis. There is much dispute, however, as to whether there really is an absence of gliosis, in untreated cases.

The question of whether or not pathological changes occur in the peripheral nerves in cases of pernicious anaemia with neurological manifestations has recently become one of great importance in regard to the explaining of certain nervous symptoms which cannot be attributed to the pathology in the cord. Sufficient investigation has not been done on this problem to warrant a definite opinion being expressed, but in quite an appreciable number of cases fairly marked degenerative processes have been found in the dorsal nerve roots with similar but less extensive damage in the more peripheral parts of the nerves.

Incidence.

Great variation of opinion exists as to the incidence of cord changes in cases of primary anaemia, but the belief is becoming more prevalent that if all cases were examined carefully for signs of neurological involvement at routine intervals practically all patients would at one time or another demonstrate signs of cord degeneration.

With regard to age, before the institution of liver therapy the cord changes were found most frequently between 40 and 50 years, while since 1926 the maximum has occurred between 50 and 65 years, suggesting that treatment with liver succeeds chiefly in postponing the onset of nervous symptoms. There appears to be little difference in the incidence in males and females.

The average R.B.C. on the onset of symptoms of cord damage has been found to be between 2 and 2½ million. But cord changes may begin with a red count of 4 million or over, and H. H. Hyland even states that cord degeneration seems to occur more often in cases whose haemoglobin is quite high than in those in whom it is very low.

Etiology.

The cause of Addisonian anaemia itself is one of the mysteries of medicine. Many theories have been evolved, the one at present enjoying the most support being that it is a deficiency condition. This contention finds corroboration in the similarity between pernicious anaemia and certain secondary anaemias known to be due to deficiency diseases. Whether the missing factor is lacking in the diet or due to some defect in absorptive power from the gastro-intestinal tract has not been decided and there is much to substantiate either view. Certainly any etiological factor must be superimposed upon a constitutional diathesis which includes the pre-existence of achlorhydria and which is probably familial.

It was the old belief that the degenerative changes in the spinal cord were due to the anaemia itself but this theory has been abandoned because similar nervous lesions do not occur in many secondary anaemias in which the actual blood changes are much more pronounced than in many primary anaemias which develop neurological symptoms.

It is likely that the neurotoxin attacking the cord and the haemotoxin damaging the haematopoitic tissues are quite distinct because the nervous and blood manifestations of the disease display such marked dissociation from one another in many cases. Yet they must both be produced by the same underlying condition because, as stated before, changes in the cord identical with subacute combined degeneration are found only in pernicious anaemia with the exception of certain very rare secondary anaemias. Here again we find suppost for the theory of some deficiency by the similarity between the cord changes in this condition and those found in sprue, pellagra, beri-

beri, ergotism and other proven deficiency diseases.

Signs and Symptoms.

The signs and symptoms of combined degeneration of the cord are found to correspond very exactly with the anatomical lesions in the cord with the exception of the dyaesthesias such as numbness and tingling of extremities. These are being explained more and more commonly on the basis of a peripheral neuritis or root neuritis. Involvement of the dorsal columns of the cord cuts off the fibres of the fasciculi gracilis and cuneatus producing ataxia, incoordination, loss of sense of position and of vibration sense of the extremities. When the degenerative condition spreads to the pyramidal tracts of the lateral and ventral columns of white matter, spastic paraplagia developes with extensor plantar responses, exaggerated reflexes and clonus.

The first nervous symptoms to appear are usually the dyaesthesias mentioned before, or hyperaesthesia or anaesthesia, all these phenomena beginning in the great toe and spreading centrally to assume a stocking distribution and subsequently appearing in the upper extremities in glove distribution. This peculiar localization is strongly suggestive of a peripheral neuritis which is further substantiated by the occurrence in some cases of loss of ankle jerks. Since the degenerative changes in the cord begin in the thoracic region and this loss of tendon reflexes appears early in the disease, it is unlikely that its origin is in the cord. Also pathologists are agreed that the dorsal horn cells are not involved in the degenerative process.

The earliest conclusive evidence of actual cord damage is usually diminished vibration sense in the lower extremities, and subsequently all the signs mentioned previously indicating posterior and lateral column damage may follow.

Hence the whole list of possible signs and symptoms of subacute combined degeneration of the cord is: Paraesthesias including numbness and tingling of glove and stocking distribution, anaesthesia to touch and pin prick of varying degree and extent, hyperaesthesia, impaired vibration sense, impaired muscle and joint sense resulting in incoordination and ataxia especially in the lower limbs, absent or exaggerated reflexes, altered cutaneous reflexes, altered sphincteric control (difficulty, incontinence, retention and precipitancy of micturition), dyaesthesias (girdle sensations, pains in back and limbs, objects feeling cold to skin), astereognosis, extensor plantar responses and more rarely athetoid movements, optic atrophy, nystagmoid movements, diplopia and mental disturbances of all kinds. A spastic paraplegia is generally considered the most common motor disability in the disease.

The Effect of Liver Treatment on Nervous Symptoms and Pathology.

The efficacy of liver treatment on the neurological changes of primary anaemia is a matter of great dispute. We do not know why nervous lesions in the one case improve and in another progress when both are under the same treatment. There are undoubtedly differences in various cases which are not apparent to the observers. For example, one must bear in mind the effect of even mild infections on the progress of the case. As in Diabetes Mellitus infection may bring on a relapse in spite of the continuance of apparently adequate measures of treatment, and the nervous symptoms tend to return more rapidly than the R.B.C. falls. It is also apparent that larger amounts of liver are required to effect improvement in the nervous symptoms than to bring the blood picture to normal, and that intensive liver therapy must be continued for several months after the R.B.C. and Hb have been brought up to high levels before the

nervous symptoms should be considered hopeless.

In evaluating the reports of various investigators in favour or against the belief that treatment of cases of pernicious anaemia with cord changes benefits the nervous symptoms, the possibility of natural remissions must be considered although H. H. Hyland expresses the opinion that such do not occur in the neurological manifestations. Also the presence of a root or peripheral neuritis superimposed upon the cord changes must be watched for and improvements in this not attributed to benefit in the cord. Nor must gain in general strength decreasing such symptoms as loss of motor power, gait and ataxic phenomena be ascribed to regeneration in the cord.

Certainly it may be stated that response to liver in all cases of pernicious anaemia depends on: (1) The dosage of liver and duration of treatment, more liver being needed for the nervous symptoms; (2) The stage of the disease at which treatment is started—the earlier the better the outlook; (3) The presence of sepsis as mentioned before; (4) The age and condition of the patient—for example, arteriosclerotic old people do not respond nearly as well to treatment as do young people; (5) The duration of the nerve changes—acute severe symptoms of rapid development and short duration improving dramatically while chronic cases resist treatment.

In favour of an actual cord benefit, four points contraindicting that improvement is due to improved blood and general condition are: (1) Degeneration of the cord may occur in the absence of anaemia; (2) It may fail to improve in spite of a high R.B.C.; (3) It may improve with a low R.B.C.; (4) Cessation of liver administration may cause a relapse of either the nervous or blood symptoms without the other.

It all resolves to this, that the optimists declare that the pessimists' patients have not received sufficient liver. The pessimists quote their patients' satisfactory bood pictures as arguments against this presumption. But the optimists waive this as evidence of adequate therapy, declaring that much greater doses of liver are required to gain nervous improvement though the blood findings may be brought up to 100 per cent. with much smaller doses.

To get to the root of the problem the actual changes in the cord and the effects of liver upon these must be studied. Taking into consideration the changes found in treated and untreated cases the chief differences are:

(1) A much more extensive gliosis in cases treated by liver, the astrocyte processes forming an interweaving mat throughout the areas of degeneration. The theory that liver decreases the concentration of the neurotoxin to a level at which it acts merely as an irritant is a very plausible argument as a cause of this gliosis. But when the theory is carried further and the supposition made that if more liver were given the neurotoxin might be completely destroyed and the cord degeneration cease without any resulting scarring, it begins to take on rather fantastic proportions. In any other part of the body damaging lesions as extensive as that found in subacute combined degeneration of the cord are invariably followed by the formation of scar tissue. Also it is beginning to be thought that there is more extensive gliosis in cases of combined degeneration of the cord untreated with liver than was previously believed. The gliosis seems to be a hypertrophy of astrocytes with great increase in the number of their processes. As this process goes on the glial bodies seem to shrink and disappear leaving a mat of glial fibres—an essentially poorly nucleated mass. At any rate the mere discovery of a paucity of astrocyte nuclei cannot be taken as evidence of absence of gliosis.

(2) The second difference noted is in the character of the myelin degener-

ation in the treated and untreated case. In the untreated case the myelin sheaths are markedly swollen and beaded. This feature could not be ascertained in the treated cases with nearly as much distinctness, and E. A. Linell suggests that the myelin sheaths in this case have not had room to swell due to the increased gliosis. The likelihood is that the degeneration proceeds up and down the cord always a little in advance of the gliosis which follows closely in its wake if the treatment is being continued.

(3) The third feature noted is that often the extent of the process is much greater in the treated cases than in the untreated. If one explains this on the basis of the fact that treatment keeps cases alive for much longer periods and hence allows more time for the development of cord changes, one is tacitly admitting that progression of cord lesions may occur despite so-called adequate treatment.

It must be pointed out that in pernicious anaemia in the areas of degeneration in the cord a few axis cylinders are still left until a late stage of the disease. This may account for cases of recovery after apparent absolute loss of function. The few remaining axis cylinders may be trained to carry sufficient impulses for the patient to carry on and even appear to improve. There is certainly no evidence of any regeneration in neurones once destroyed.

It is the writer's immature opinion, after sorting out a very conflicting mass of literature, that once definite signs of cord involvement have become evident, these are not objectively improved except to such an extent as may be accounted for on the grounds of disappearance of oedema in those parts of the cord just beyond the advancing margin of the degeneration, and the possibility of such disappearance of oedema occurring is substantiated by the rapid and complete recovery observed in acute cases of sudden onset. Any other improvements noted must be due to healing of a root or peripheral neuritis, increased strength, cure of the anaemia and re-training of the few remaining nerve fibres in the degenerate regions of the cord.

The question of improvement seems unimportant, however, in comparison with that of prevention. From the nature of the pathology of subacute combined degeneration of the cord one cannot expect substantial improvement after the disease has been in progress for a considerable time. Axones in the central nervous system once destroyed, cannot be made to function again. But the bulk of literature tends to point to the belief that in no truly adequately treated case of pernicious anaemia need nervous lesions develop or progress, and on this we must pin our hopes.

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